Concurrent Enrollment Course Outline

High School Name: Cincinnatus Central School

Credit Hours: 3

Date Proposal Submitted/Prepared: April 24, 2014

Student Audience – Grade Level(s): 9-12

Instructor: Nicole Rice

Semester(s) Offered: Full Year *(September-June)*

TC3 Course #: CSS 112

Instructor e-mail and/or phone #: nrice@cc.cnyric.org, 607.261.9300

TC3 Course Title: Hardware Repair and Maintenance

Course Description: This course prepares students for building, upgrading, maintaining, and repairing personal computers and peripherals. Students acquire an awareness of service shop practice, shop safety, and business practice. To provide hands on practice with tools working with test and real equipment being used in school.

Course Prerequisites: Computer Applications in the three unit computer program. Ability to hold and use hand tools and lift computer equipment.

Minimal Basic Skills Needed to Complete Course Successfully: High school level reading, spelling, writing skills, basic math and computer skills, the ability to follow directions and a willingness to learn to operate technical equipment.

Course Context/Audience

Students who want to learn about computer hardware repair and maintenance. Enrollment must be approved by a Cincinnatus Central Computer Teacher.

Course Objectives

1. To help students develop hardware troubleshooting skills.
2. To help students develop hardware installation skills.
3. To help students develop hardware configuration and upgrading skills.
4. To help students learn how to use hand tools and test equipment, inventory tracking systems and interpret technical manuals.
5. To help students configure hardware for a network.

Course Goals

The student will be able to effectively document and track hardware inventory.
The student will be able to list and describe hardware diagnostic and repair tools.
The students will be able to identify and solve computer communication problems.
The student will be able to apply safe shop practices.
The student will be able to describe types and components of the Motherboard.
The student will be able to list and describe the boot process steps.
The student will be able to list and describe ports and expansion slots.
The student will be able to run hard disk optimization tools.
The student will be able to describe different CPU chips.
The student will be able to install and/or upgrade computer components such as: Hard drive, Memory, Network card, video card, USB port, card readers, DVD, and SMART Boards.
Students will be able to detect problems and repair and/or replace the following: Printer, Power supply, and Mouse.
Students will be able to build a computer system.

CRITICAL THINKING OUTCOMES

Students will be able to

- develop meaningful questions to address problems or issues.
- gather, interpret, and evaluate relevant sources of information.
- reach informed conclusions and solutions.
- consider analytically the viewpoints of self and others.

Student will use both software and hardware vendor supplied documentation, in addition to company provided documentation for guidance in hardware installation and configuration.
The student must apply both technical knowledge and practiced hardware installation and repair skills. The hardware problem solving process in this course requires that the student look at alternative solutions to a problem and evaluate those solutions for the most effective solution.

SOCIAL/GLOBAL AWARENESS OUTCOMES

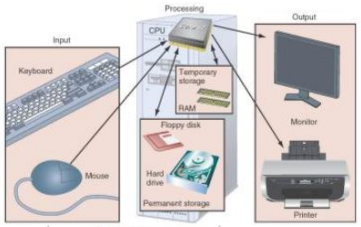
- Students will begin to understand how their lives are shaped by the complex world in which they live.
- Students will understand that their actions have social, economic and environmental consequences.

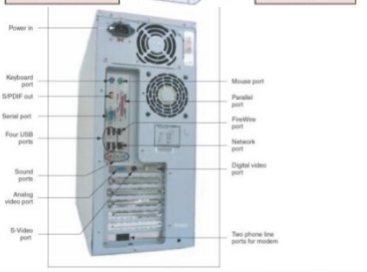
Required Texts and Materials/Optional Materials as Appropriate: A+ Guide to Managing and Maintaining Your PC, Jean Andrews. Lab Manual for A+ Guide to Managing and Maintaining Your PC. Course Technology, ISBN: 0-619-18619-4.

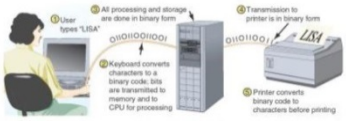
Class Modalities/Alternative Learning Strategies: This class is to be taught hands-on. The first time a new job is assigned to a student in training they will be paired up with the instructor or an experienced student. Once trained the student may work independently in completing tech support tickets entered from end users online or projects assigned from the white board daily to do list. When training the entire group at once, one hour sessions will be setup at special dates and times in a computer lab with an LCD projector for demonstrations.

Course Content Presented in Units or Segments
(Required Readings, Presentations, Written Assignments, etc.):

First 10 Weeks







Pictures from assigned Text:
A+ Guide to Managing and Maintaining Your PC.

Introducing Hardware – Read **Chapter 1**

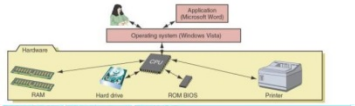
Project: Set up two identical computers side by side. Take out all the internal parts of one computer, turn around and put all the parts back in. Keep the identical computer covered until just before turning on the test computer to assure parts are in correctly. Troubleshoot if computer does not come back on properly.

Project: Look at a home computer. Make a diagram, label all the ports used (for what) and unused (spares). Use the computers manual or online documentation to help label all ports.

Introducing Operating Systems – Read **Chapter 2**

Project: Configure a Windows desktop designed for a student, teacher, and office worker at school. Screen shot the perfect configurations.

Project: Demonstrate 10 Windows keyboard short cuts that you would use regularly to optimize your time on the job as a hardware support person. Find at leat one new keyboard shortcut from documentation on the Windows website.

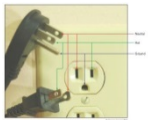


General Action	Keystrokes	Description
While loading Windows	F8	To display the Advanced Boot Options menu.
	Spacebar	To display the Windows boot menu.
Managing Windows and applications	F1	To display Help.
	Alt+Tab	To move from one loaded application to another.
	Ctrl+Tab and Ctrl+Shift+Tab	To move through tabbed pages in a dialog box.
	Alt+ESC	To cycle through items in the order they were opened.
	F6	To cycle through screen elements in a window or on the desktop.
	Win or Ctrl+Esc	Display Start menu. Use arrow keys to move over the menu. (The Win key is the one labeled with the Windows flag icon.)
	Win+E	Start Windows Explorer.
	Win+M	Minimize all windows.
	Win+Tab	Move through items on the taskbar.
	Win+R	Display the Run dialog box.
	Win+Break	Display the Vista System window or the XP System Properties window.
	F5	Refresh the contents of a window.
	Alt+F4	Close the active application window, or, if no window is open, shut down Windows.

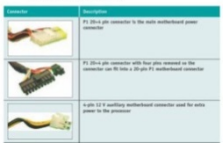
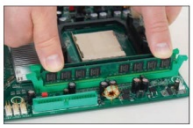
Working with People in a Technical World – Read **Chapter 3**

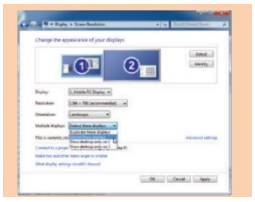
Project: Name five job roles that qualify as a PC Technician.

Project: For safety, list five ways to be safer when working on electrical equipment like computers and list five ways to protect your back when lifting and setting down heavy equipment. Also include five tools every computer technician should have (show a picture for each tool).



Project: Fill 3 tech support calls from online work requests. Take a note pad with you and write down one thing on each call that you did differently to improve on your social skills learned from chapter 3 to do a better job. Also list 5 things you would want to see in a PC repair person if you were the one with the computer

	problem. Be honest and note if you did this.
Second 10 Weeks   	**Form Factors and Power Supplies –** Read **Chapter 4** Project: SMART UPS can be controlled by software. Locate one of the districts server APC SMART UPS and diagnose the UPS. Check for a weak battery and report the status. Use the DVD and or documents that shipped with the UPS. Project: Open a PC and local all the power sources back to the power supply. List the devices with power and the ones without. **Supporting Processors and Upgrading Memory** – Read **Chapter 5** (All about mother boards and the chip – the brain of a computer.)  Project: To practice installing additional memory in a computer in a classroom environment, remove the DIMMs or RIMMs from one computer and place them in another computer. Boot the second computer and check that it counts the additional memory. When finished, return the borrowed modules to the original computer. Refer to your text book or other documentation to know which RAM is compatible eo work with other types of RAM. Project: The most important component on the motherboard is the processor, or central processing unit. The two major manufacturers of processors are Intel and AMD. Open a Dell computer in a high school computer lab and determine what processor is used, then compare to Intel or AMD online. Which one is faster and what is the estimated cost of each chip? Note 2 other differences in comparing chips. **Supporting Hard Drives** – Read **Chapter 6**  Project: Prepare for Hard Drive Hardware Problems 1. Boot your PC and make certain that it works properly. Turn off your computer, remove the computer case, and disconnect the data cable to your hard drive. Turn on the computer again. Write down the message that you get. 2. Turn off the computer and reconnect the data cable. Reboot and make sure the system is working again. 3. Turn off the computer and disconnect the power supply cord to the hard drive. Turn on the computer. Write down the error that you get. 4. Turn off the computer, reconnect the power supply, and reboot the system. Verify the system is working again. Project: Install a Hard Drive In a lab that has one hard drive per computer, you can practice installing a hard drive by removing a drive from one computer and installing it as a second drive in another computer. When you boot up the computer with two drives, verify that both

	drives are accessible in Windows Explorer. Then remove the second hard drive, and return it to its original computer. Verify that both computers and drives are working.
Third 10 Weeks	**Supporting I/O and Storage Devices –** Read **Chapter 8** Project: Using a lab computer connected to the Internet, go to Device Manager and attempt to update the drivers on all your installed devices. Which devices did Windows find newer drivers for?  Project: For group presentations that require a projector, configure your LCD projector as a dual monitor to display a presentation to your audience at the same time you are using the computer screen for the presenter facing the audience. Project: Learn How Optical Drives Work Optical drives and other removable storage technologies are interesting to study. Check out the animated explanation at the web site of www.howstuffworks.com. Search on "How Removable Storage Works." List 10 facts you learned about optical drives. Find a desktop in the school that does not have a card reader and install one from the parts closet. Use Manage My Computer to configure the correct drive letters. Use letters WUTY to match the setup on other school computers. Logon with student or teacher level access and test if the card reads correctly. Project: SMART Board wiring install. Completely wire a new SMART Board with all cables including, USB, audio, networking, VGA or HDMI, for a school classroom. This can be done with a brand new board or an existing one that needs the wring straightened up. From Start all wires should be lined up on the floor and one by one installed. Test all functions are working properly before ending. Allow yourself at least two hours start to finish. **Troubleshooting Hardware Problems** – Read **Chapter 13** Project: Take any hardware tech support call from the online calls and visit the end user and ask the following questions before troubleshooting the job. Note any answers that helped you fix the problem and any that saved you time. • Can you describe the problem and describe when the problem first started and when it occurs? • Was the computer recently moved? • Was any new hardware or software recently installed? • Was any software recently reconfigured or upgraded? • Did someone else use your computer recently? • Does the computer have a history of similar problems?

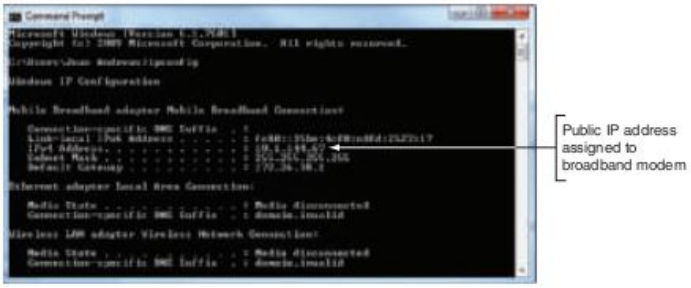
- Is there important data on the drive that is not backed up?
- Can you show me how to reproduce the problem?

Project: Visit a computer lab or classroom with at least two computers. Blow out the dust inside the computer and on the fan. Run the computer diagnostics at boot up to test all hardware. Start both computers at the same time and note if they run at the same pace and report the same findings. If you discover hard ware problems swap items and test again. If parts needed call the vendor for parts under warranty.

Project: How to dispose of used equipment? Every three to four years we face an assortment of outdated equipment and consumables. Before trashing it all, we need to inventory and prepare it for recycle. Using the asset tag removal form (provided by the network administrator) record five items for recycle in our parts closet, include serial numbers, year manufactured, and description. Turn your sheet into the network administrator so items may be removed from inventory for the districts and auditor's records.

Connecting to and Setting Up a Network – Read **Chapter 15**

Project:
Investigate TCP/IP Settings
Using a computer not yet connected to the network, join the Cincinnatus Domain ad.csd.cnyric.org and answer these questions:



1. What is the hardware device used to make this connection (network card, onboard port, wireless)? List the device's name as Windows sees it in the Device Manager window.

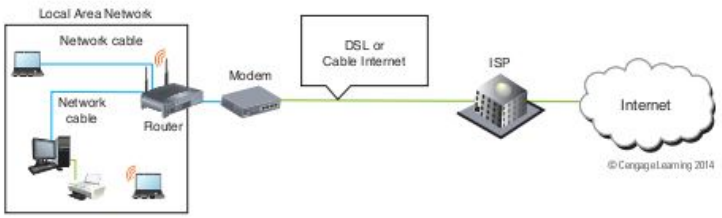
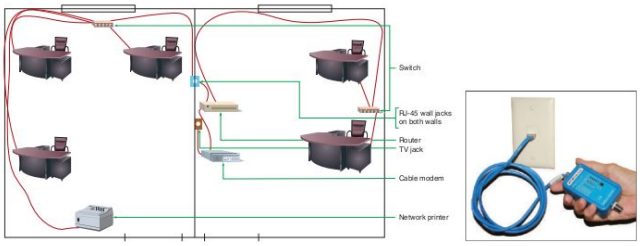
2. What is the MAC address of the wired or wireless network adapter? What command or window did you use to get your answer?

3. What is the IP address of the network connection?

4. Are your TCP/IP version 4 settings using static or dynamic IP addressing?

5. Disable and enable your network connection at a DOS prompt. Now what is your IP address? What command did you use?

Project: Using a school laptop remove any wired connection to the school network and connect wirelessly to the district's network. Check settings to see if your

	connection is good and if you can navigate fast online. Go to a site like http://www.bandwidthplace.com/ and test your bandwidth. Make note of your upload and download speeds. Then connect the laptop back wired to the network and test speed again. Compare speeds, which is faster and by how much? 
Fourth 10 Weeks	**Networking Types, Devices, and Cabling** – Read **Chapter 16**   Project: Use cable testers to find the two ends of a network cable in our building. Try to find a rack or wall location not labeled clearly and trouble shoot until you confirm the port on the switch. Sow results and re-label the port and wall connection more clearly for the team.  Project: Compare the lights from the Network Interface Card (NIC) of two identical PCs. One plugged into a network connection and one plugged in half way almost out. What colors do you see and compare speeds and styles of the flashing lights? State differences. Many times a connection is down because a wire is not plugged in tightly. **Security Strategies** – Read **Chapter 18** Project: A computer or network can be so protected that no one can use it, or so accessible

that anyone can do whatever they want with it. The trick is to provide enough security to protect your resources while still allowing users to work unhindered. Using a brand new or formatted machine use a “perfect user” profile to setup a new machines default settings. Test the logon from a student profile. Look for settings like the school’s website as the home page and access denied in changing the background on the desktop.

Project: Anti-virus protection. Visit any classroom or office PC and make sure anti-virus software is updating the definition files. Also check that no second virus program or spyware is running that could slow down the machine, only one should be running. If you discover a virus or Trojan, use a third pary software like www.malewarebytes.com to remove, then uninstall the temporary download.

Mobile Devices and Client-Side – Read **Chapter 20**

Project: Working with the school’s iPads update and configure one iPad in a group of five, backup to iCloud and then restore your perfect iPad to the other 4 devices. Make sure the device connects easily to the district’s Wi-Fi and automatically. Update settings, download shared apps, turn off cellular data, name the device, and other common settings. Turn on Find My iPhone.

Project: Update an office workers iPhone and check it is backing up to iCloud. Turn on Find My iPhone. Also look for data driven apps like Pandora and tell it to run only on Wi-Fi. Configure the staff member’s webmail to use the web client http://mail.cc.cnyric.org/servlet/traveler and also setup to show a number count when new mail has arrived.

Supporting Printers – Read **Chapter 21**

Project: There is always at least one printer not working in the building. Use the

	following questions to troubleshoot the problem. Try also renaming the printer rather than using an IP address, when done fixing note what you did and if the questions helped save time. • Is the printer online? • Turn the printer off and back on. Try rebooting the computer. • Verify that the correct default printer is selected. • Consider the IP address of the printer might have changed, which can happen if the printer is receiving a dynamic IP address. Using Windows, delete the printer, and then install the printer again. If this solves the problem, assign a static IP address to the printer to keep the problem from reoccurring. • Can you print to another network printer? If so, there might be a problem with the printer. Look at the printer's configuration. • Try pinging the printer. To do that, open a command prompt window and enter ping 170.158.68.XXX (substitute printer IP). • Type the printer IP into your browser and see if the printer needs ink, replace if so.
	Using your experience from the course. Your final is the tearing down and rebuilding a desktop system. All internal parts are removed from the PC and then you have 30 minutes to re-assemble all parts in working order. You may choose to fulfill this project anytime during the fourth marking period. Student must make an appointment with the teacher and setup the test equipment on their own.
Andrews, Jean (2013-01-01). A+ Guide to Managing & Maintaining Your PC (Page 877). Cengage Textbook. Kindle Edition. (Above photos also taken from textbook.)	

TC3 Grading Chart		
Grading Definitions	**Grade**	**Quality Points per academic credit hour***
High Achievement	A	4.0
	A-	3.7
Good Achievement	B+	3.3
	B	3.0
	B-	2.7
	C+	2.3
Satisfactory Achievement	C	2.0
Below Satisfactory Achievement	C-	1.7
	D+	1.3
	D	1.0
	D-	0.7

Failing	F	0.0

Evaluation/Grading System

Participation, attendance, and effort.	20%
Hands on projects from text book chapters and filling online tech support tickets.	50%
A major project of tearing down and rebuilding a desktop system. Student may choose to fulfill this project anytime during the fourth marking period. Student must make a 30 minute appointment with the teacher and setup the test equipment on their own.	30%
Total	100%

Statement of Academic Integrity: Students will adhere to the guidelines set forth in the Cincinnatus Central Student Handbook as well as the District's Internet Acceptable Use Policy.

Tompkins Cortland Community College's Statement of Academic Integrity

Every student at Tompkins Cortland Community College is expected to act in an academically honest fashion in all aspects of his or her academic work: in writing papers and reports, in taking examinations, in performing laboratory experiments and reporting the results, in clinical and cooperative learning experiences, and in attending to paperwork such as registration forms.

Any written work submitted by a student must be his or her own. If the student uses the words or ideas of someone else, he or she must cite the source by such means as a footnote. Our guiding principle is that any honest evaluation of a student's performance must be based on that student's work. Any action taken by a student that would result in misrepresentation of someone else's work or actions as the student's own — such as cheating on a test, submitting for credit a paper written by another person, or forging an advisor's signature — is intellectually dishonest and deserving of censure.

Make-Up Policy/Late Work: A day missed is to be made up during a study hall or after school. Three unexcused absences will result in the lowering of a letter grade. Being late to three class periods will result in one absence. Days not made up are given a participation grade of zero.

Attendance Policy: Attendance will be defined by the timely submission of all required assignments (hands on or posts) and daily class work.

Student Responsibilities:

1. To report to work on time and work hard the entire schedule
2. Informs appropriate individuals on progress of assignment
3. Results are consistently successful
4. Skill level is clearly at a computer technician level or higher
5. Deadlines are met
6. Respect is shown at all times to personnel and end users
7. Trustworthy with access given to the school's network